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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR       | ATTORNEY DOCKET NO.          | CONFIRMATION NO.       |
|---|-------------|----------------------------|------------------------------|------------------------|
| 10/502,236  | 03/30/2005  | Peter John Herbert Carnell | JMYS-116US                   | 1885                   |
| 23122   | 7590        | 09/05/2007                 |                              |                        |
| RATNERPRESTIA<br>P O BOX 980<br>VALLEY FORGE, PA 19482-0980 |             |                            | EXAMINER<br>YOUNG, NATASHA E |                        |
|   |             |                            | ART UNIT<br>1709             | PAPER NUMBER           |
|   |             |                            | MAIL DATE<br>09/05/2007      | DELIVERY MODE<br>PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                               |                                |  |
|------------------------------|-------------------------------|--------------------------------|--|
| <b>Office Action Summary</b> | Application No.<br>10/502,236 | Applicant(s)<br>CARNELL ET AL. |  |
|                              | Examiner<br>Natasha Young     | Art Unit<br>1709               |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 March 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☐ Claim(s) 1-11 and 13-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11, 13-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>07/22/2004</u> . | 6) <input type="checkbox"/> Other: _____  |

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## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-2 and 7-8, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ayers et al (US 2,592,523) in view of Matsumoto (JP 2002-020865).

Regarding claim 1, Ayers et al teaches a method of making a sulphided ion exchange resin containing primary or secondary amino groups and the concomitant removal of hydrogen sulfide and mercaptans from a non-aqueous liquid feedstock comprising passing said feedstock containing hydrogen sulphide and mercaptans through a bed of an ion exchange resin containing primary or secondary amino groups, thereby forming a sulphided ion exchange resin containing primary or secondary amino groups (see column 2, 3<sup>rd</sup> paragraph).

Ayers et al does not teach the removal of elemental sulphur or organic or inorganic di- or poly-sulphides.

Matsumoto (JP 2002-020865) teaches carbon disulfide, an organic disulphide, removal with a weak basic anion exchange resin having a polyamine functional group of a hydrocarbon feedstream of a naphtha cracking process, a fraction (see paragraphs 0001-0002). This reference teaches that the petroleum fraction contains not only hydrogen sulfide and mercaptans but also carbon disulfide.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Ayers et al with the teachings of Matsumoto, which allows for the efficient and simple removal of carbon disulfide, in addition to hydrogen sulfide and mercaptans, with the use of an ion exchange resin containing primary or secondary amino groups from a petroleum fraction (naphtha cracking process fraction) (see Matsumoto paragraphs 0002 and 0004).

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Regarding claim 2, Ayers et al teaches the non-aqueous liquid feedstock is passed through a bed of a hydrogen sulphide absorbent after passage through the bed of the ion exchange resin (see column 6, 3<sup>rd</sup> paragraph).

Claim 7 depends on claim 1 such that the reasoning used to reject claim 1 will be used to reject the dependent portions of the claim.

Regarding claim 7, Ayers et al teaches the liquid is a hydrocarbon (see column 1, 2<sup>nd</sup> paragraph).

Claim 8 depends on claim 7 such that the reasoning used to reject claim 7 will be used to reject the dependent portions of the claim.

Regarding claim 8, Ayers et al teaches the liquid is selected from the group consisting of natural gas liquids and gasoline (see column 1, 2<sup>nd</sup> paragraph).

Claim 10 depends on claim 1 such that the reasoning used to reject claim 1 will be used to reject the dependent portions of the claim.

Regarding claim 10, Ayers et al teaches a sulphided ion exchange resin containing primary or secondary amino groups (see column 2, 3<sup>rd</sup> paragraph and column 3, 2<sup>nd</sup> paragraph).

Claims 3-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ayers et al (US 2,592,523) and Matsumoto (JP 2002-020865) in view of Alexander et al (US 6,059,962).

Claims 3-6 depend on claim 1 such that the reasoning used to reject claim 1 will be used to reject the dependent portions of the claims.

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Regarding claim 3, Ayers et al does not teach the removal of water from the ion exchange resin before use.

Alexander et al teaches too much hydration of the catalyst or acidic resin catalyst can soften the catalyst, physically agglomerate and create high pressure drops in fixed bed reactor (see column 12, 4<sup>th</sup> paragraph).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Ayers et al with the teachings of Alexander et al and remove water before use for a more reliable ion exchange resin absorbent.

Regarding claim 4, Ayers et al does not teach the ion exchange resin is in the form of a fixed bed of shaped units having a maximum and minimum dimensions in the range of 0.5 to 10 mm.

Ayers et al teaches a fixed bed but the size of the granular absorbent was not given (see column 2, 3<sup>rd</sup> paragraph).

Alexander et al teaches a polymeric sulfonic acid resin catalyst of an average diameter of 0.1 mm about to 2 cm (see column 12, 2<sup>nd</sup> paragraph and column 13, 3<sup>rd</sup> paragraph).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Ayers et al with the teachings of Alexander et al to promote the conversion of sulfur-containing impurities to a higher boiling sulfur-containing material (see Alexander et al column 14, 2<sup>nd</sup> paragraph).

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Regarding claim 5, Ayers et al does not teach the non-aqueous liquid feedstock is contacted with the ion exchange resin bed at temperatures in the range of 10°C to +100°C under sufficient pressure that the feedstock is in the liquid state.

Ayers et al teaches a packed condenser (see column 2, 3<sup>rd</sup> paragraph), which would have sufficient pressure such that the feedstock is in the liquid state.

Alexander et al teaches the non-aqueous liquid feedstock is contacted with the ion exchange resin bed at temperatures in the range of 10°C to +100°C under sufficient pressure that the feedstock is in the liquid state (see column 1, 2<sup>nd</sup> paragraph). It is understood that since the process operates with the boiling range of the feedstock the hydrocarbons are in liquid form.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Ayers et al with the teachings of Alexander et al to ensure operation within the liquid stage.

Regarding claim 6, Ayers et al does not teach the ion exchange resin is periodically regenerated by treatment with an acid.

Ayers et al does teach the regeneration of the resin (see column 6, 2<sup>nd</sup> paragraph) but this is done through a caustic wash.

Alexander et al teaches the use of an acid wash (see column 14, 1<sup>st</sup> paragraph).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Ayers et al with the teachings of Alexander et al to remove the basic nitrogen-containing impurities (see Alexander et al column 14, 1<sup>st</sup> paragraph).

Claims 9, 11, 13-14, and 15-16 rejected under 35 U.S.C. 103(a) as being unpatentable over Ayers et al (US 2,592,523) and Matsumoto (JP 2002-020865) in view of Duisters et al (EP 0 319 615 A1).

Claims 9 and 11 depend on claim 1 such that the reasoning used to reject claim 1 will be used to reject the dependent portions of the claims.

Regarding claim 9, Ayers et al does not teach said non-aqueous liquid feedstock further comprises mercury or inorganic mercury compounds, and wherein at least the inlet portion of the bed of an exchange resin is sulphided before a mercury containing stream is passed through the bed, thereby to remove said mercury or organic mercury compounds from said non-aqueous liquid feedstock.

Duisters et al teaches that mercury very often occurs in organic media, especially non-polar organic media like hydrocarbon mixtures during their process or storage (see page 2, column 1, 1<sup>st</sup> and 3<sup>rd</sup> paragraphs).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Ayers et al with the teachings of Duisters et al since it is known hydrocarbons mixtures contain mercury or inorganic mercury compounds (see Duisters et al page 2, column 1, 1<sup>st</sup> and 3<sup>rd</sup> paragraphs).

Regarding claim 11, Ayers et al teaches a method for passing a non-aqueous liquid feedstock through a bed of a sulphided ion exchange resin containing primary or secondary amino groups according to claim 1.

Ayers et al does not teach a method for the removal of mercury and organic mercury compounds from a non-aqueous liquid feedstock comprising passing the



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feedstock through a bed of a sulphided ion exchange resin containing primary or secondary amino groups according to claim 1.

Duisters et al does teach a method for the removal of mercury and organic mercury compounds from a non-aqueous liquid feedstock comprising passing the feedstock through a bed of a sulphided ion exchange resin (see page 2; column 1, 5<sup>th</sup> paragraph and column 2, 1<sup>st</sup>, 2<sup>nd</sup>, and 4<sup>th</sup> paragraphs).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Ayers et al with the teachings of Duisters et al for added utility of mercury removal of the product taught in the Ayers et al reference.

Claim 13 depends on claim 11 such that the reasoning used to reject claim 11 will be used to reject the dependent portions of the claim.

Regarding claim 13, Ayers et al teaches the liquid is a hydrocarbon (see column 1, 2<sup>nd</sup> paragraph).

Claim 14 depends on claim 13 such that the reasoning used to reject claim 13 will be used to reject the dependent portions of the claim.

Regarding claim 14, Ayers et al teaches the liquid is selected from the group consisting of natural gas liquids and gasoline (see column 1, 2<sup>nd</sup> paragraph).

Claims 15-16 depend on claim 11 such that the reasoning used to reject claim 11 will be used to reject the dependent portions of the claims.

Regarding claim 15, Ayers et al does not teach the ion exchange resin is in the form of a fixed bed of shaped units having a maximum and minimum dimensions in the range of 0.5 to 10 mm.

Ayers et al teaches a fixed bed but the size of the granular absorbent was not given (see column 2, 3<sup>rd</sup> paragraph).

Duisters et al teaches a polymeric sulfonic acid resin catalyst of an average diameter of 0.3 mm about to 1.2 mm (see page 2, column 2, 4<sup>th</sup> paragraph).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Ayers et al with the teachings of Duisters et al to remove more than 97% of the mercury in the feedstock (see page 3, column 1, 4<sup>th</sup> paragraph).

Regarding claim 16, Ayers et al does not teach the non-aqueous liquid feedstock is contacted with the ion exchange resin bed at temperatures in the range of 10°C to +100°C under sufficient pressure that the feedstock is in the liquid state.

Ayers et al teaches a packed condenser (see column 2, 3<sup>rd</sup> paragraph), which would have sufficient pressure such that the feedstock is in the liquid state.

Duisters et al teaches the non-aqueous liquid feedstock is contacted with the ion exchange resin bed at temperatures in the range of 10°C to +100°C (see page 2, column 2, 6<sup>th</sup> paragraph) under sufficient pressure that the feedstock is in the liquid state (see column page 2, column 2, 7<sup>th</sup> paragraph).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Ayers et al with the teachings of Duisters

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et al to remove more than 97% of the mercury in the feedstock (see page 3, column 1, 4<sup>th</sup> paragraph).

### **Conclusion**

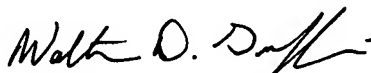
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Huff, Jr. et al (US 6,048,451).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Natasha Young whose telephone number is 571-270-3163. The examiner can normally be reached on Mon-Thurs 7:30am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Griffin can be reached on 571-272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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